

PATENT  
Attorney Docket  
851-167-1

U. S. PATENT APPLICATION

of

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Relating to

COSMETICS AND MASCARA BRUSHES WITH MULTI-FIBER BRISTLES

Express Mail No.: EV 252883117 US

5 COSMETICS AND MASCARA BRUSHES WITH MULTI-FIBER BRISTLES

FIELD OF THE INVENTION

10 The invention herein relates to cosmetics and mascara brushes having engineered multi-fiber bristles deployed extending from a core.

BACKGROUND OF THE INVENTION

15 This application claims benefit of our U.S. Provisional Patent Application Serial No. 60/393666, filed July 3, 2002.

Cosmetics brushes are used to carry cosmetics to the point of application and to apply the cosmetics in a controlled manner. The cosmetics may be for a variety of purposes, such as lip gloss, eye shadow, eyeliner, eyebrow make-up, and mascara. The ability of a brush to carry and apply cosmetics is largely determined by its bristles.

20 Mascara brushes in particular have two primary functions; namely, they apply mascara to the eyelashes and they comb the eyelashes to provide separation. The selection of the bristles of the brush, as well as their density, are important factors in how well the mascara brush can perform these two functions. Many times the two functions are not synergistic or even complementary, and therefore compromises must be made in selecting the bristles for the brush.

5           Various types of bristles have been used in mascara brushes. The primary choice for bristles has been synthetic polymer materials, generally in a diameter range of approximately .003 inches to approximately .006 inches. These materials have included nylon, polyesters and various blends and composites of polymers, often chosen so that the mascara product would adhere to the bristles for carrying the mascara product to the eyelashes and applying it.

10           Certain specialty bristles have been developed with various cross-sectional variations, such as quadrilobal bristles, trilobal bristles, and bristles having a "C" shaped cross section which might also be described as hollow bristles each having a longitudinal slot. These specialty bristles have a good ability to carry product, due to their special cross-sectional shapes, and also tend to spread out and form a bushier more even brush when deployed between a twisted wire  
15           core. Hollow bristles are also popular in mascara brushes, in large part because of their ability to form a bushy brush.

          Mascara brushes have also been proposed with mixtures of different types of bristles, wherein the bristles are independently deployed along a twisted wire core. Schrepf U.S. Patent 4,861,179 is an example of such a mascara brush, in which different types of bristles are  
20           randomly intermingled along a twisted wire core, and wherein the bristles are independent of each other and stand alone in extending from the twisted wire core. Even though some of the bristles may be softer and more flexible than others, they are limited in this regard by the requirement that they have sufficient rigidity to stand on their own. Therefore, a very fine bristle otherwise advantageous for applying mascara cannot be used in a mascara brush of this type.

5           Fitjer U.S. Patent 6,443,162 discloses a mascara brush with bristles formed of multiple fibers that are fixed together along a substantial length of the fiber. The fibers are separated at the ends of the bristles. Thus, the sides of the bristles resemble a conventional bristle of non-circular cross-section, and the number of tip ends is limited.

10           Formulas for mascara are also being improved, but present brushes are not always capable of advantageously applying the new formulations. Other cosmetics brushes have similar requirements. For example, eyebrow brushes must be able to apply product and comb eyebrows, and eyebrow brushes must be able to carry product and place the product in the desired position.

15           It is clear from the above considerations that it would be desirable to enhance the capability of a mascara brush to apply mascara, as well as provide for good combing, and to improve brushes for applying other cosmetics as well.

#### SUMMARY OF INVENTION

          It is a principal object of the invention herein to provide an improved cosmetics brush.

20           It is also an object of the invention to provide a cosmetics brush that may accomplish combing and curling when applying or spreading cosmetics products.

          It is an additional object of the invention to provide an improved mascara brush well adapted to both apply mascara and to comb and separate eyelashes.

5           It is a further object of the invention to provide a mascara brush, incorporating multi-fiber bristles in a manner that enhances both application of mascara and the combing and separation of eyelashes.

          It is another object of the invention to provide a cosmetics brush that is adaptable to a variety of cosmetics formulations.

10           It is also a principal object of the invention to provide engineered multi-fiber brushes for use in cosmetics brushes, and especially mascara brushes.

          In carrying out the foregoing objects of the invention, a cosmetics brush, and particularly a mascara brush, is provided having a plurality of bristles wherein the plurality of bristles are comprised of multiple fibers. The multiple fibers are deployed in supportive interengagement to  
15           form the multi-fiber bristles, and the multi-fiber bristles are deployed extending from a core. A twisted wire core is provided in preferred embodiments.

          According to additional aspects of the invention, the multi-fiber bristles include different kinds of fibers. Some of the fibers in each multi-fiber bristle may be stiffer than others, thicker than others, or both, and the fibers may be of different materials and have different  
20           characteristics. Multi-fiber bristles are provided wherein some of the fibers are stiff and self-supporting, and wherein other fibers placed and retained together with the self-supporting fibers are substantially limp and are supported by the stiffer fibers.

          In further aspects of the invention, the multi-fiber bristles are comprised of a central support fiber supporting a plurality of thin fibers substantially surrounding the central fiber. In  
25           accordance with more specific aspects, fibers formed of microfiber may be braided or woven

5 about the exterior of the central support fiber. Tip ends of the microfiber may form tufts.  
Alternatively, a stiff support fiber may have a hollow interior, with or without a longitudinal  
entry slot, and microfibers or other thin fibers are supported within the hollow interior, with their  
tip ends extending outwardly from the tip ends of the stiff support fiber.

10 In another aspect of the invention, the multi-fiber bristles comprise a core of thin fibers,  
which may be microfibers, and a spiral-wrapped outer support fiber, with the thin fibers  
protruding from the ends of the outer support fiber and along the spiral slot defined by the  
spirally wrapped outer support fiber.

15 Also, in accordance with other aspects of the invention, the multi-fiber bristles are a  
plurality of fibers braided together. In some instances, some of the fibers braided together are  
themselves twisted or braided groups of finer fibers, which may be microfibers, providing tufted  
tip ends.

The exposed portions and ends of the thin fibers or microfibers are especially well  
adapted to carry and apply mascara, and the multi-fiber bristles are also useful in combing  
eyelashes.

20 In carrying out the foregoing objects of the invention, the engineered multi-fiber bristles  
may be used with various core structures and in brushes for cosmetics other than mascara.

The foregoing and other objects and features of the invention will be readily understood  
by those skilled in the art, and will also appear in more detail in the following description of the  
preferred embodiments and the claims, taken together with the drawings.

5 BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a schematic view of a mascara brush according to the invention herein, utilizing a first type of multi-fiber bristles;

10 Fig. 2 is a schematic view of another mascara brush according to the invention herein, utilizing a different type of multi-fiber bristles;

Fig. 3 is a schematic view of another mascara brush according to the invention herein, utilizing another different type of multi-fiber bristles; and

Fig. 4 is a schematic view of another mascara brush according to the invention herein, utilizing yet another different type of multi-fiber bristles.

15 The same reference numerals refer to the same elements throughout the various figures.

DESCRIPTION OF PREFERRED EMBODIMENTS

20 Fig. 1 illustrates a cosmetics brush, namely, a first mascara brush 10, according to the invention herein. The mascara brush 10 generally comprises a core 12, which may be formed of two wires 14 and 16 twisted together, as is well known in the art, or may be another core. The mascara brush 10 further incorporates a plurality of multi-fiber bristles 20, 21, 22, with additional multi-fiber bristles being incorporated in the mascara brush 10 but not being shown for sake of clarity. The multi-fiber bristles 20, 21, 22 are captured between the two wires 14 and 25 16 of the twisted wire core 12, and extend generally radially outward therefrom.

5 Multi-fiber bristle 20 has a central support fiber 24 with tip ends 26 and 28. The support fiber 24 has a relatively large diameter and is sufficiently stiff to flexibly support the multi-fiber bristle 20 in its radial extension from the twisted wire core 12, including during application of mascara and combing of eyelashes.

10 The multi-fiber bristle 20 also has a plurality of additional fibers 30, 31, 32, etc., that are braided, woven or otherwise supportively interengaged with and surrounding the central bristle 24. The additional fibers 30, 31 and 32 are smaller diameter, more limp fibers and are substantially supported by the central support fiber 24. The additional fibers 30, 31 and 32 provide a braided or woven outer surface area along the length of the central support fiber 24, except that adjacent to the tip ends 26 and 28 of the central support fiber 24, the braided or  
15 woven areas of the additional fibers 30, 31, 32 are unraveled to present a plurality of tip ends of the exterior fibers 30, 31, 32, etc. These tip ends are illustrated in Fig. 1 as tip ends 36, 37 and 38. In some instances, these tip ends are sufficiently numerous as to form tufts surrounding the support fiber 24. The other multi-fiber bristles 21, 22 and those not shown are similarly constituted, although they may be mixed with yet other bristles, if desired. The other bristles  
20 may include solid bristles, hollow bristles or other known bristles.

The multi-fiber bristles 20, 21, 22 and therefore the mascara brush 10 have unique functional characteristics. The exterior of the multi-fiber bristles 20, 21 and 22 have the braided or woven areas described above, and therefore provide a textured surface that is well suited to accumulate mascara from a mascara container and to apply mascara. The tip ends 36, 37, 38 of  
25 the fine fibers 30, 31, 32 are well positioned for applying and spreading mascara onto eyelashes,



5 when the outer surface of the mascara brush 10 is stroked lightly over the eyelashes, i.e. when  
the tips of the multi-fiber bristles are engaged on the eyelashes.

The multi-fiber bristles 20, 21, 22 as a whole are also well adapted to act as a comb when  
the mascara brush 10 is more deeply engaged with the eyelashes, and more particularly with  
individual eyelashes positioned between the multi-fiber bristles which therefore act similarly to  
10 teeth of a comb. Further, the braided or woven surface areas of the multi-fiber bristles 20, 21, 22  
may apply additional layers of mascara as the mascara brush 10 is used for combing.

The central support fiber 24 of each multi-fiber bristle of the mascara brush 10 may be a  
solid nylon fiber having a diameter in the range of about .003 inches to about .012 inches. In the  
mascara brush 10, the central support fiber 24 is nylon and is about .005 inches in diameter. The  
15 central support fiber may also be a hollow fiber, and may be of material other than nylon, such  
as a polyester or other known bristle material. The additional fibers, 30, 31, 32, etc., may be  
made of small diameter monofilament or of bundles of fine microfiber, with the additional fibers  
having a diameter of about .001 inches or in the range of about .0005 to .0015 inches. When  
microfiber is used to constitute the additional fibers 30, 31, 32, etc., the microfibers may  
20 themselves be bundled and/or twisted to form the additional fibers 30, 31, 32 before the  
additional fibers are braided or woven about the central support bristle 24. In mascara brush 10,  
there are four fibers 30, 31, 32, etc., braided about support fiber 24, each additional fiber being  
itself made from about 20 nylon microfibers, i.e. of thin filaments. The fibers 30, 31, 32 are 70-  
denier, at approximately 70 picks per inch. The microfiber has an irregular cross section,  
25 wherein the microfiber tends to interlock into one fiber 30, 31, 32, etc., especially when twisted.

5       The overall diameter of the preferred multi-fiber bristles 20, 21, 22 is about .009 - .011 inches, although it may be larger or smaller.

Other materials may be used for the additional fibers 30, 31, 32, etc. The materials may include other polymers, such as polyesters and urethanes, and may also include natural fibers such as linen, cotton and silk. An elastic component may also be included, if desired. It will  
10       also be appreciated that additional fibers of different material may be used to form a multi-fiber bristle, with the materials being chosen to achieve a bristle that complements the cosmetics. Thus, the cosmetics brush 10 may be engineered for specific applications.

The multi-fiber bristles 20, 21, 22, etc. may be deployed in a density from about 10 to 80 multi-fiber bristles per turn of the twisted wire core 12, although the mascara brush 10 has a  
15       much higher total fiber count because of the composite nature of each of the multi-fiber bristles. It will be appreciated that the mascara brush 10 is mounted on an applicator rod and utilized as part of a mascara container, all in accordance with known methods and apparatus for applying mascara.

Fig. 2 illustrates another mascara brush 50 according to the invention herein. It also has  
20       a twisted wire core 52 fabricated of two wires 54 and 56, which capture a plurality of multi-fiber bristles, including multi-fiber bristles 60, 61 and 62 shown in Fig. 2. It will be appreciated that the mascara brush 50 has additional multi-fiber bristles, not shown, and may have other bristles interspersed with the multi-fiber bristles, as desired.

The multi-fiber bristle 60 has a first relatively large diameter support fiber 64, which is  
25       sufficiently strong to support the multi-fiber bristle 60 in its entirety. The support fiber 64 has a

5 “C” shaped cross section with a hollow interior and a slot opening 66 extending along the length  
of the fiber 64 between its tip ends 68, 69. The multi-fiber bristle 60 also has a plurality of  
relatively thin, small diameter central additional fibers 70 which generally are not able to support  
themselves, but which are positioned in supportive interengagement within the hollow interior of  
the support fiber 64 and are surrounded and supported by the first bristle 64. The plurality of  
10 central fibers 70 have their tip ends, collectively designated at 72 and 74, extending beyond the  
tip ends 68 and 69 of the support fiber 64. These tips may form into tufts of fine fiber ends. The  
other multi-fiber bristles 61, 62, etc., are the same or similar to multi-fiber bristle 60, but may be  
mixed with other bristles to form brush 50.

The multi-fiber bristles 60, 61, 62 therefore provide multiple, fine diameter tip ends 72  
15 and 74 for carrying and applying mascara to the eyelashes. This is achieved when the mascara  
brush 50 is lightly engaged with the eyelashes so that the eyelashes are presented to the tip area  
of the brush 50. When the mascara brush 50 is more deeply engaged with the eyelashes, the  
eyelashes become positioned between the multi-fiber bristles 60, 61, 62, which then serve to  
separate and comb the eyelashes.

20 The support fiber 64 and the corresponding support fibers of the other multi-fiber bristles  
may be fabricated of nylon, polyester, or other suitable polymer bristle material, and may have a  
diameter in the range of about .005 to about .015 inches. The support fiber may be extruded  
over the additional central fibers 70. The central fibers 70 may be polyester microfiber, and may  
have quite small diameters, on the order of .0005 inches or less. They may also be nylon or  
25 another polymer, or various natural materials. However, it will be appreciated that a smaller

5 number of larger diameter central fibers 70 may be accommodated and utilized within the support fiber 64, and that the additional central fibers may be a mix of fibers of various materials and diameters. The multi-fiber bristles of mascara brush 50 may be provided in a range of about 10 to 80 multi-fiber bristles per turn of the twisted wire stem 52. The resultant mascara brush 50 is mounted at the end of an applicator rod and utilized in a mascara container, in accordance with  
10 known methods and apparatus in the art.

Another mascara brush 100 is illustrated in Fig. 3. The mascara brush 100 also has a twisted wire core 102 formed of two wires 104, 106 and a plurality of multi-fiber bristles 110, 111, 112, etc., captured by and extending from the twisted wire stem 102.

The multi-fiber bristle 110 is characterized by a support fiber 114 having tip ends 116  
15 and 118. The support fiber 114 is a spirally configured strip, which defines a central opening 120 and a spiral slot 122 between adjacent portions of the strip. The central opening 120 is best seen on the corresponding support fiber 115 of multi-fiber bristle 111, where it is given number 121.

The support fiber 114 is wrapped about and supportively engages a plurality of central  
20 additional fibers 130, which are fine fibers of relatively small diameter such that the multi-fiber bristle 110 relies primarily on the support fiber 114 for its stiffness. However, the central fibers 130 do contribute to the stiffness and form of multi-fiber bristle 110 because they substantially fill the center opening and bridge the spiral slot 122.

The central fibers 130 have tip ends at 132 and 134 which extend beyond the tip ends 116  
25 and 118 of the first support fiber 114. These ends may take the form of tufts. Also, portions of

5 the central bristles 130 indicated at 136 and 138 protrude through the spiral slot 122 defined by the fiber 114, wherein portions of the fine diameter central fibers are presented along the length of the multi-fiber bristle 110.

10 The multi-fiber bristles 110, 111 and 112 provide for excellent application of mascara to eyelashes and also for combing and separation of eyelashes. The tip ends 132, 134 of the central fibers 130 and the protruding portions 136 and 138 of the central fibers serve to carry and apply mascara, and the overall stiffness of the multi-fiber bristles provide for good combing action. It will also be noted that during combing, the protruding portions 136 and 138 of the central fibers may incrementally add mascara for layering effects.

15 The support fiber 114 of the multi-fiber bristle 110 is fabricated of a thermoplastic material having good memory characteristic, so that it will retain its spiral configuration. It may have a diameter in the range of about .005 inches to about .020 inches. The central fibers are generally about .001 inches in diameter, and may be monofilament or bundles of a polyester microfiber or one of the other materials mentioned above. The central fibers 130 may be provided in lengths less than the entire length of the multi-fiber bristle 110, in that they are captured and supported by the support fiber 114, but are preferably longer to maximize the number of tip ends. Mixtures of fiber types may be used. It will be appreciated that the mascara brush 100 is mounted on an applicator rod for use in mascara containers of the known type.

25 With reference to Fig. 4, a mascara brush 150, according to the invention herein, is illustrated. It has a twisted wire stem 152, having two wires 154 and 156 twisted together, and the twisted wire stem captures a plurality of multi-fiber bristles 160, 161, 162, etc. The multi-

5 fiber bristles 160, 161 and 162 are a plurality of different types of individual fibers 170, 172, 174, etc., braided together in supportive interengagement, wherein each of the individual fibers is selected to work with the other fibers to provide desirable characteristics of the multi-fiber bristle. The multi-fiber bristles may include monofilament fibers 170 of nylon, polyester or the like, generally having a diameter in the range of about .001 inches or less to about .002 inches or  
10 slightly more. The multi-fiber bristles may also include fibers 172, which may also be .001 - .002 inches in diameter and are each twisted, bundled or braided from multiple strands of smaller microfiber. They provide a large plurality of tip ends 173, to assist in carrying and applying mascara, i.e. the tip ends 173 are the ends of the multiple strands of microfiber that make up the fibers 172. Further, fiber 174 may be a small hollow fiber, and fiber 176 may have a unique  
15 cross section, such as quadrilobal, trilobal or C-shaped cross sections. These fibers and others may be variously incorporated in a multi-fiber bristle 160.

When the various fibers are braided together, they provide a multi-fiber bristle with a textured outer surface and with spaces or interstices throughout the cross-section of the bristle. The stiffness of the multi-fiber bristles 160, 161, 162 is established by the selection of individual  
20 fibers, and for instance, utilizing one or more solid fiber having a high stiffness with respect to its diameter will maintain a desired stiffness of the overall multi-fiber bristle that also includes fibers made of twisted microfiber or the like.

The overall diameter of the multi-fiber bristles 160, 161 and 162 may be in the range of about .005 to about .020 inches and the multi-fiber bristles are deployed in a density of  
25 approximately 10 to 80 bristles per turn of the twisted wire stem 12.

5           It will be appreciated that the mascara brushes as described above are well adapted to  
apply mascara to eyelashes and to comb the eyelashes, in that the engineered combinations of  
fibers and the inclusion of some fibers or groups of fibers with tufted or flagged ends results in  
the multi-fiber bristles well adapted to carry mascara, while the thickness and stiffness of the  
multi-fiber bristles can be adjusted for good combing action. The inclusion of several types of  
10 fibers in the multi-fiber bristles permit the fabrication of a mascara brush with highly desirable  
characteristics and, more importantly, provides the designer of the mascara brush with numerous  
options for adjusting the characteristics for best performance with particular mascara products.

          It will also be appreciated that these multi-fiber bristles are useful in other types of  
cosmetics brushes, wherein it is desirable to carry and apply cosmetics with fine fibers, but also  
15 desirable to have a sufficiently stiff bristle that the cosmetics can be accurately place, or to have  
combing capability.

          Accordingly, the mascara brushes described above admirably achieve the objects of the  
invention. It will be appreciated that various changes be made by those skilled in the art without  
departing from the spirit and scope of the invention, which is limited only by the following  
20 claims.